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PATENT SPECIFICATION

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PROVISIONAL SPECIFICATION.

Improvements in Thermionic Valves.

We, GUGLIELMO MARCONI, G.C.V.O., LL.D., D.Sc., Italian subject, of Savoy Court, Savoy Hotel, Strand, London, W.C. 2, and CHARLES SAMUEL FRANKLIN, British subject, of "The Clough", 39, Palmerston Road, Buckhurst Hill, in the County of Essex, do hereby declare the nature of this invention to be as follows:—

This invention relates to thermionic valves, and more especially to valves suitable for the production of very short waves of the order of two or three metres long or even less.

In hitherto known arrangements for generating waves by means of thermionic valves, the extent to which the wave length can be reduced is limited by the physical dimensions of leading in wires and seals necessary, and by the length of such leads.

According to the present invention the whole primary circuit associated with the valve is located within the valve itself, and preferably the arrangement is such that all or some of the inductances and capacities comprising the said primary circuit are formed by the electrodes themselves and the supports therefor.

In one form of construction the grid and anode of a three electrode valve are arranged concentrically about the filament which is supported from the glass foot step of the valve by the usual filament seals. The grid is supported by means of a metal cone, or a number of metal strips lying along the surface of an imaginary cone, attached to a metal ring surrounding the footstep. The anode is supported by means of a metal cylinder or a number of metal strips lying along the surface of an imaginary cylinder, attached to a second metal ring surrounding and supported by the first metal ring, but insulated therefrom by mica or the like. Connection is made to the grid and anode by means of two small seals, that for the anode carrying the high tension supply, and that for the grid carrying the grid current.

It will be seen that with this arrangement the oscillatory circuit is comprised by the condensers formed by the grid and anode and by the rings supporting them in series with inductances formed by the metal cone and cylinder supporting the grid and anode respectively. Thus the primary circuit is wholly inside the valve and therefore the seals do not have to carry any heavy high frequency currents.

Energy (for exciting a tuned aerial or the like) may be drawn from the circuit by electrostatic induction to the filament leads by means of a small condenser connected thereto on the valve side of chokes inserted in series with the said filament leads.

In a modification, which is, in effect, two valves in a single envelope, two filaments are provided at opposite ends of a glass bulb. Each filament has associated therewith a grid and an anode supported in any convenient way, the two grids being connected together and also the two anodes, by means of metal cylinders or strips lying along the surfaces of imaginary cylinders.

Connection is made to the anodes and grids by means of two small seals.

This construction has been found to give a very short wave length for a given length of valve, the said wave length being generally about twice the distance

[*Price* 1*s.*]

between the two anodes, if concentric cylinders be employed for connecting the anodes and grids.

It has been found that for very short waves the aerial itself may advantageously be included in the same envelope as the valve, but generally coupling by way of the filament leads or by electrostatic effect through the glass is sufficient.

Dated this 14th day of October, 1925.

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24, Southampton Buildings, London,
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COMPLETE SPECIFICATION.

Improvements in Thermionic Valves.

We, GUGLIELMO MARCONI, G.C.V.O., LL.D., D.Sc., Italian subject, of Savoy Court, Savoy Hotel, Strand, London, W.C. 2, and CHARLES SAMUEL FRANKLIN, British subject, of "The Clough", 39, Palmerston Road, Buckhurst Hill, in the County of Essex, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to thermionic valves, and more especially to valves suitable for the production of very short waves of the order of two or three metres long or even less.

In hitherto known arrangements for generating waves by means of thermionic valves, the extent to which the wave length can be reduced is limited by the physical dimensions of leading in wires and seals necessary, and by the length of such leads.

According to the present invention the whole primary circuit associated with the valve is located within the valve itself, and the seals carry only the anode feed and grid currents and preferably the arrangement is such that all or some of the inductances and capacities comprising the said primary circuit are formed by the electrodes themselves and the supports therefor.

In one form of construction, the grid and anode of a three electrode valve are arranged concentrically about the filament which is supported from the glass foot-step of the valve by the usual filament seals. The grid is supported by means of a metal cone (or a number of metal strips lying along the surface of an imaginary cone), attached to a metal ring surrounding the foot-step. The anode is supported by means of a metal cylinder or a number of metal strips lying along the surface of an imaginary cylinder, attached to a second metal ring surrounding and supported by the first metal ring, but insulated therefrom by mica or the like. Connection is made to the grid and anode by means of two small seals, that for the anode carrying the high tension supply, and that for the grid carrying the grid current.

It will be seen that with this arrangement the oscillatory circuit is comprised by the condensers formed by the grid and anode and by the rings supporting them in series with inductances formed by the metal cone and cylinder supporting the grid and anode respectively. Thus the primary circuit is wholly inside the valve and therefore the seals do not have to carry any heavy high frequency currents.

Energy (for exciting a tuned aerial or the like) may be drawn from the circuit by electrostatic induction to the filament leads by means of a small condenser connected thereto on the valve side of chokes inserted in series with the said filament leads.

In a modification, which is, in effect, two valves in a single envelope, two filaments are provided at opposite ends of a glass bulb. Each filament has associated therewith a grid and an anode supported in any convenient way, the two grids being connected together and also the two anodes, by means of metal cylinders or strips lying along the surfaces of imaginary cylinders.

Connection is made to the anode and grids by means of two small seals.

This construction has been found to give a very short wave length for a given length of valve, the said wave length being generally about twice the distance between the two anodes, if concentric cylinders be employed for connecting the anodes and grids.

The invention is illustrated in the accompanying drawings, in which Figure 1 is a section of a single valve, according to the invention, and Figure 2 is a section of a double valve according to the invention.

Referring to Figure 1, the valve comprises an evacuated bulb B, containing a filament F, a grid G, and an anode A, supported upon a glass footstep W. Around this footstep are mounted two metal rings, O and P, with an insulating ring M between them. Connection is made to these two rings by wires which pass through seals G, S and A, S respectively. The grid is supported from the ring O by means of a number of metal strips X, and the anode is supported from the ring P by means of a number of metal strips Y. The capacity between the rings O and P should be large compared with the capacity between the anode A and grid G.

It will be seen that the anode-grid capacity, in series with the capacity between the rings O and P, and the inductances of the strip connections X and Y, constitutes an oscillatory circuit which may easily be constructed to have an extremely high natural frequency. The seals A, S and G, S through which connections are made to the anode and grid respectively, carry merely the anode feed current and grid currents respectively, and do not have to carry the high frequency current. They can therefore be made comparatively small.

The modification shown in Figure 2 is a double valve having two sets of filaments, grids, and anodes, F^1, G^1 and A^1 and F^2, G^2 and A^2, mounted in a single bulb B.

The anodes A^1 and A^2 are connected together by metal strips Y, the grids G^1 and G^2 being similarly connected by metal strips X. From the centre points of these strips, connections are brought to the outside of the valve through seals A, S and G, S respectively.

The anodes and grids may be supported in any convenient manner from the footstep of the valve, or otherwise.

It will be seen that in this arrangement there is a natural oscillatory circuit comprising the capacity between the anode A^1 and the grid G^1, in series with the capacities A^2, G^2, and the inductances of the strips X and Y.

It has been found that for very short waves, the aerial itself may advantageously be included in the envelope of the valve, but generally coupling by way of the filament lead or by electrostatic effect through the glass is sufficient.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A thermionic valve oscillation generator, in which the oscillatory circuit is wholly within the envelope of the valve, and the seals for making connection to the anode and grid carry only the anode feed and grid currents respectively, substantially as described.
2. An arrangement as claimed in Claim 1, in which the oscillatory circuit comprises inter-electrode capacities and the inductances and capacities of electrode supports and rings associated therewith, substantially as described.
3. An arrangement as claimed in Claim 1 or 2 in which the valve is double and comprises two inter-connected grids and two interconnected anodes, substantially as described.
4. An arrangement as claimed in any of the preceding claims, in which the aerial is also included in the envelope of the valve.
5. Thermionic valve oscillation generators, substantially as described with reference to the accompanying drawings.

Dated this 14th day of August, 1926.

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2nd Edition

Fig. 1.

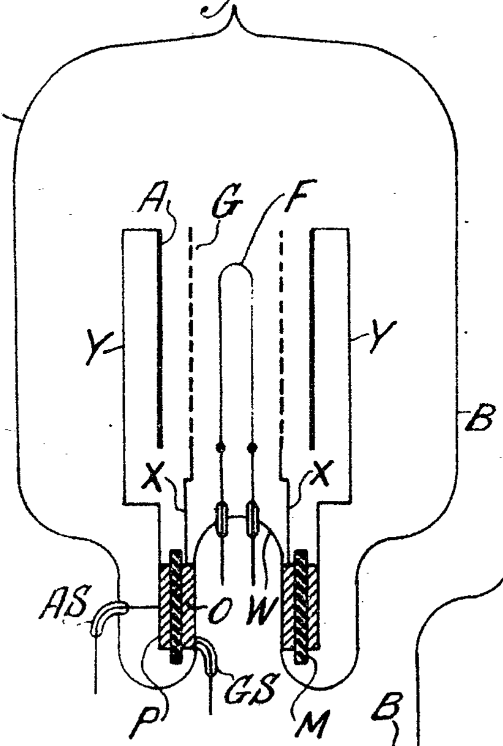
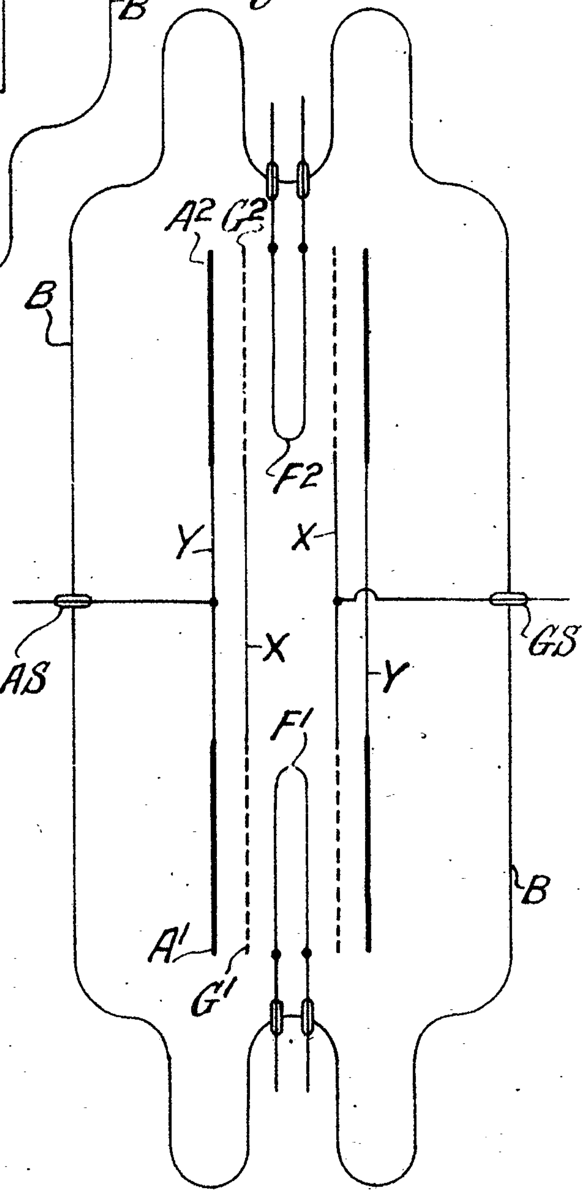


Fig. 2.



[This Drawing is a reproduction of the Original on a reduced scale.]

Charles & Read Ltd. Photo Litho.